

K H R O N O S[®]
G R O U P



WebGL BOF SIGGRAPH 2019

WebGL Working Group

What's New In WebGL

- WebGL Ecosystem Updates
- WebGL 2.0 Compute
- Key extensions requested by customers
 - KHR_parallel_shader_compile
 - Multi-draw
 - WEBGL_video_texture
 - BaseVertex / BaseInstance
- Speaker Lineup

WebGL Ecosystem Updates

Lots of cool new WebGL projects released over the past year! A few examples:

- [Basis Universal](#) released as open-source!
 - [WebAssembly module](#) - works in all browsers
 - [glTF demo](#), [texture demo](#)
 - [Using Basis Textures in Three.js](#)
- [Classic Minecraft!](#)
- [Google Earth via WebAssembly!](#)
- [Doom 3 WASM](#) - new performance improvements!
- [noclip.website](#)
- Newton Protocol, WebGL 2.0 demo, won the PC 4K category at the Revision 2019 competition! ([pouet.net](#), [YouTube](#))
- [Fluid simulation by PavelDoGreat](#) ([announcement](#), [original Codepen](#))
- [Wolfenstein Raytraced with WebGL 1.0](#)
- <https://play.gl/>

WebGL Ecosystem Updates

- [Dust, a Rust-based game engine \(announcement\)](#)
- Cesium announced [Series A Investment](#) and spin-out!
- [Three.js path tracing renderer](#)
 - [Geometry showcase](#), [Ocean and sky rendering](#)
- **Shadertoy**s: [Sanctuary \(2\)](#), [Doodling #7: Speed](#), [Torus pipes \(announcement\)](#)
 - Follow [@Shadertoy!](#)
- <https://hair-simulation.lusion.co/>
- [tuqire's webcam outline \(source, announcement\)](#)
- [Crystal demo](#)
- [Fluid Geometry](#)
- [Why you should start to create 3D content for the web](#)

WebGL Ecosystem Updates

- Heart arrhythmia simulations done in WebGL! By researchers from Georgia Tech and the Rochester Institute of Technology.
 - <http://advances.sciencemag.org/content/5/3/eaav6019>
 - <http://chaos.gatech.edu/eaav6019/>
 - <http://www.rh.gatech.edu/news/619757/using-smartphones-and-laptops-simulate-deadly-heart-arrhythmias>
 - Another paper using the same library they developed, but with examples of chaos and fractals:
 - <https://www.sciencedirect.com/science/article/pii/S0960077919300037>

WebGL Ecosystem Updates

- Demo: [Xeokit](#)
 - [Conference center demo](#)
 - Purpose-built open source SDK for high-detail 3D engineering visualization on the Web.
 - Loads metadata alongside each model (eg. BIM metadata) to classify and assist navigation of the 3D objects.
 - Loads models from glTF2, OBJ, STL, 3DXML and XKT (a native binary format optimized for xeokit).
 - Based on lessons learned during ten years developing WebGL engines for STEM.
 - Currently used by around eight BIM software firms, some of which sustain its development through commercial licensing fees.

WebGL Ecosystem Updates

- WebGL working group is focusing on conformance - getting all implementations to pass top-of-tree conformance tests
 - James Darpinian, Google; Jeff Gilbert, Mozilla; Lin Sun, Intel
- Many corner cases of the OpenGL and OpenGL ES specs have been uncovered and resolved since last snapshot
- Will lead to improved portability of applications
- Also resolving bug reports from customers and turning these into conformance tests where possible
- Please keep these coming!
- Collaborating with Apple to integrate ANGLE into Safari's WebGL backend
 - Follow [this WebKit bug](#) for updates

WebGL 2.0 Compute

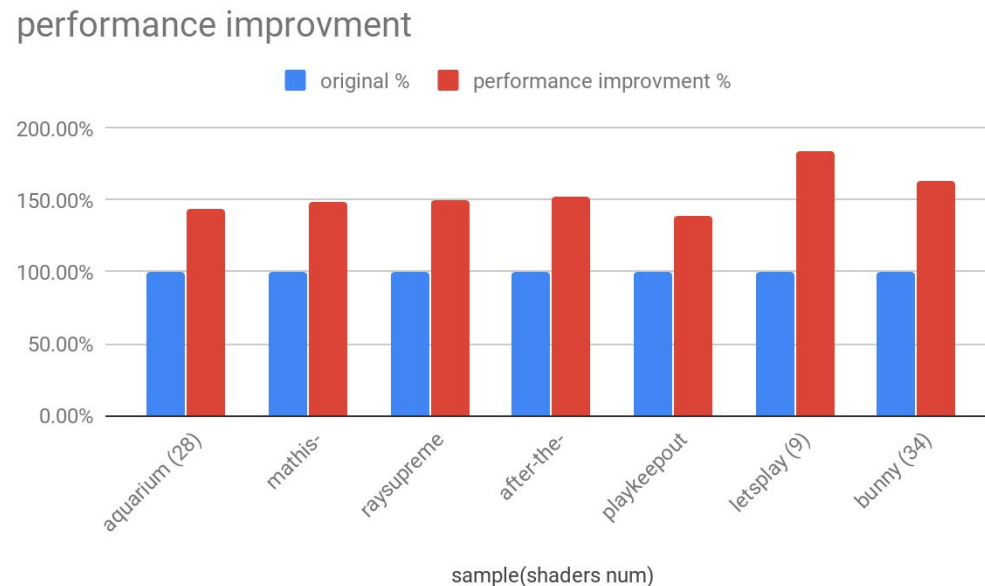
- Single largest recent WebGL advancement is support for compute shaders
- Developed by Intel's Web Graphics team in Shanghai
 - Jiajia/Jiawei/Xinghua/Jie/Jiajie/Yunfei/Yizhou/Yunchao
- Adds OpenGL ES 3.1 compute shaders to WebGL
- Draft specification is online
- Available in current Chromium builds on Windows and Linux

Trying WebGL 2.0 Compute

- Use Chrome Canary on Windows or Dev Channel on Linux
- On Windows:
 - `--use-cmd-decoder=passthrough --enable-webgl2-compute-context`
 - Optionally: `--use-angle=gl`
- On Linux:
 - `--use-cmd-decoder=passthrough --enable-webgl2-compute-context --use-gl=angle`
- First ComputeBoids demo from Intel
- More compute shader demos coming online
- Good way to start experimenting with compute shaders on the web today
- Discuss on [webgl-dev-list](#)

KHR_parallel_shader_compile

- WebGL extension was developed by Intel's Web Graphics team in Shanghai
 - Jie Chen
- Fixes longstanding customer complaints about slow WebGL shader compiles
 - Compiles become async and parallel with small app changes
- Shipping today in Chrome on Windows, other platforms/browsers soon!



Multi-Draw

- [WEBGL_multi_draw](#) and [WEBGL_multi_draw_instanced](#) decrease the CPU overhead of issuing draw calls
 - Austin Eng and Kai Ninomiya, Google
- Application receives gl_DrawID in shaders; works well with uniform updates batched into UBOs with WebGL 2.0
- Supported via emulation even on platforms without the native multi-draw extensions
- [Results from microbenchmarks](#) are impressive: 3-6x improvements in common case, up to 70x (!) in some situations
- Test in Chromium with --enable-webgl-draft-extensions
- Please tell us how it's working for you on [webgl-dev-list](#)

WEBGL_video_texture

- [Extension](#) being developed by Intel's Web Graphics team in Shanghai
 - Shaobo Yan
- Supports zero-copy video uploads into WebGL textures
- [Implementation](#) is in Chromium behind --enable-webgl-draft-extensions
- Seeing up to 47% speedups on some content
- Will appreciate your feedback; please watch Khronos' [public webgl](#) list

BaseVertex and BaseInstance Extensions

- Customer requests for both [BaseVertex](#) and [BaseInstance](#) versions of instanced draw calls
- Extensions under active development by Shrek Shao, Google
- Work is ongoing under this [Chromium bug](#); follow it for updates

Speaker Lineup

- Alban Denoyel, Sketchfab
- Christian Stein, Fraunhofer
- David Koerner, ESRI
- Gary Hsu, Microsoft
- Ib Green and Tarek Sherif, Uber
- Ricardo Cabello, Google
- Will Eastcott, PlayCanvas
- Yang Gu, Intel